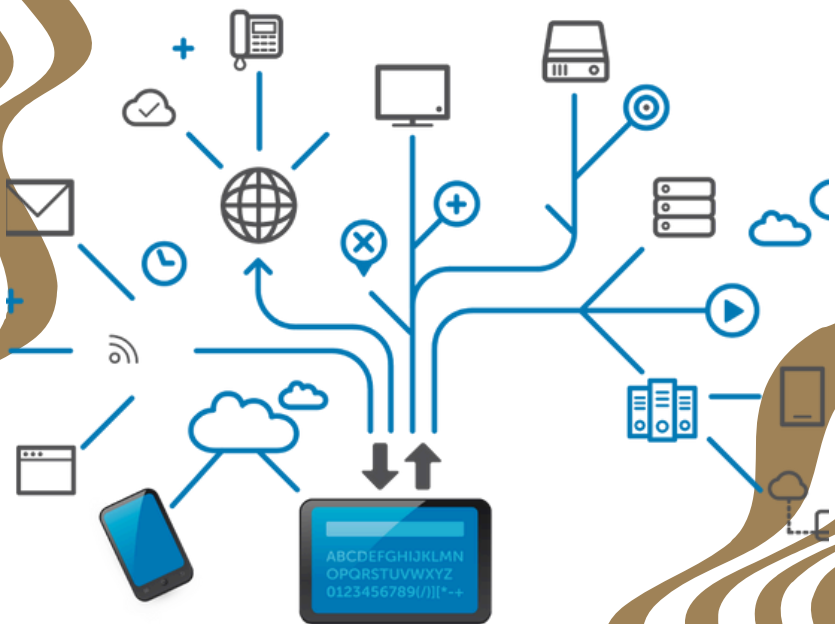
Hope Foundation's
International Institute of Information Technology, Pune

Gyanamrit

2022-23

Department of Electronics and Telecommunication



Department Magazine
Issue- 04

Department of Electronics and Telecommunication

VISION

To nurture young minds and provide them with a strong foundation through academic excellence & skill-based knowledge, transforming them into efficient professionals who can take on challenges in the fields of Electronics and Telecommunication Engineering for a sustainable technological development.

MISSION

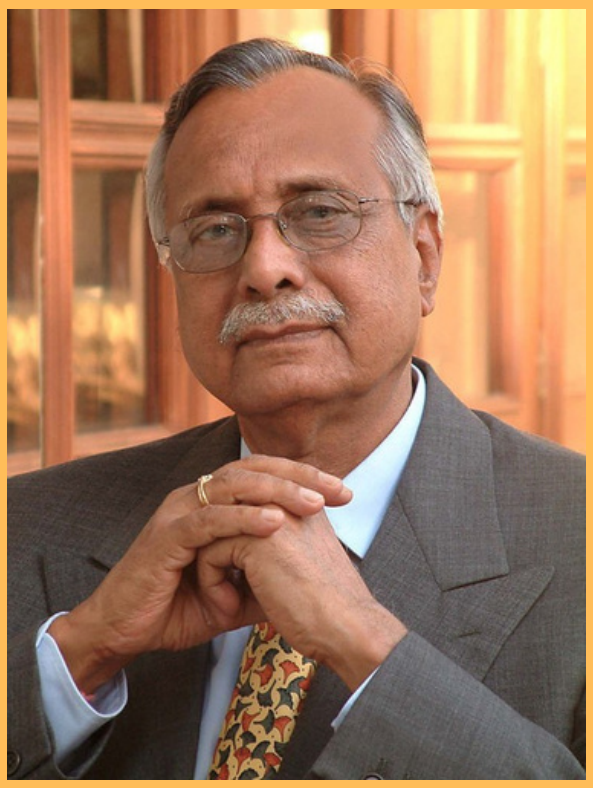
- To educate students on domain knowledge in Electronics and Telecommunication Engineering using adaptive teaching-learning practices.
- To create a conducive learning environment that offers value-added education, enabling students to be career ready.
- To cultivate research & innovation as a bent of mind among students by industry-academia interaction.
- To enrich students with self-learning ability to sustain with technological changes.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- Apply skills acquired in E&TC to analyze problems & design innovative solutions
- Inculcate the habit of self-learning using state-of-the-art technologies & innovations for continuous improvement.
- Internalize and display professional ethics, team spirit & respect societal values.
- Inspire students for higher studies & research.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- Understand fundamental concepts and acquire co-design skills of E&TC to apply them to its cognitive areas.
- Enhance programming skills for efficient coding practices using open source platforms.
- Develop analytical skills to achieve optimized and cost-effective technological solutions for challenges in E&TC.
- Bringing awareness about electromagnetic radiation hazards for the work environment



"An abiding trust in your abilities to perform, a strong determination to never give up and unshakeable belief in yourself are all you need to conquer the pinnacles of success"

Late Shri.Pralhad P.Chhabria
(12/03/1930-05/05/2016)

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- Prof. Shweta Jain

HOD's Message (Chief Editor)

Congratulations to the committee and the writers for their exceptional contributions to this edition. We trust that the content we've curated for the fourth edition of Gyanamrit will resonate with you and provide valuable insights. This issue stands as a testament to the dedication and hard work of the magazine committee and the faculty overseeing this endeavor.

We are excited to present a diverse range of Students Projects that not only enhance the linguistic, semantic, and technical skills of contributors but also enrich the knowledge of our readers. Focused on the latest advancements in Electronics and Telecommunication, this edition offers both intriguing and significant information.

Gyanamrit remains committed to providing a dynamic platform for emerging engineers to showcase their technical expertise and share their most creative and original ideas. We appreciate your time and effort in engaging with this issue and look forward to your continued support.

Prof. (Dr.) Risil Chhatrala

Faculty Incharge's message (Faculty Editor)

Hello everyone,

The enthusiastic support and diligent efforts of everyone involved in the creation of this magazine are sure to lead to its success. I would like to express my sincere gratitude to the academic members of the department and the editorial staff for their persistent hard work. My thanks also extend to the students for their valuable contributions.

This fourth edition of GYANAMRIT promises to be enlightening, informative, communicative, and inspiring. We have aimed to address topics that are highly pertinent to the latest advancements in technology. I am confident that this issue will prove to be a great success as well.

Prof. Prashant Ahire

BE Projects AY 22-23

Gyanamrit

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2. Information System (Gis)
3. Help Gesture Recognition
4. Application Development For Industrial Equipment Monitoring
5. Energy Monitoring System
6. Pedestrian and Road Obstruct Detection Using Machine Learning
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16. IoT Based Attendance System Using BLE with Wi-Fi Access Point
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Logistic Route Optimization Based on Geographic Information System (Gis)

JAY RAVIRAJ DEORE
PIYUSH NAGPAL
SHUBHAM CHAUHAN

Efficient logistics operations play a pivotal role in the success of any delivery-based company. In today's fast-paced world, optimizing delivery routes is crucial to minimize travel time, reduce costs, and enhance customer satisfaction. This project addresses these challenges by leveraging open-source mapping tools and advanced algorithms. By integrating geocoding, graph analysis, and routing algorithms, the project offers a comprehensive solution for route optimization in logistics. The system extracts geographical data and constructs a graph representation of the road network using libraries such as OSMnx and NetworkX. Through the implementation of a TSP (Traveling Salesman Problem) algorithm, the project identifies the shortest path that connects multiple delivery locations, taking into account variables such as driver capacities and vehicle constraints. The optimized routes are then visualized on an interactive map using the Folium library, providing an intuitive and user-friendly interface. The significance of this project lies in its ability to streamline delivery operations, reduce fuel consumption, and improve overall efficiency. The project's flexible architecture allows for customization based on specific business requirements, making it a valuable tool for logistics companies. By leveraging advanced mapping technologies and algorithmic optimization, this project contributes to enhancing logistics operations, ultimately leading to cost savings and improved customer experiences. With its scalable and adaptable nature, this solution has the potential to revolutionize the way delivery companies plan and execute their operations, enabling them to achieve higher productivity and stay competitive in the market.

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Help Gesture Recognition

ATHARV BOBDE
CHAITALI BHAMERE
VAISHALI GHIGE

Gesture recognition research is widely being used to overcome various problems in human life. It plays a vital role in human-computer interaction, enabling intuitive and natural communication between humans and machines. This project presents an innovative approach to develop a Help Gesture Recognition System utilizing the YOLO object detection framework. When in a dangerous situation humans are required to act quickly and precisely, such as being a victim of violence, accidents, disasters, and so on. The proposed system aims to assist individuals in emergency situations or dis tress by recognizing specific hand gestures that indicate a call for help. The system utilizes the YOLO architecture, which is renowned for its efficiency and accuracy in object detection tasks. By training the model on a large dataset of annotated im ages featuring different hand gestures, it can learn to identify the distinctive features associated with help gestures. The dataset comprises various individuals, diverse back grounds, lighting conditions, and angles to ensure robustness and generalization of the model. The developed Help Gesture Recognition System employs a real-time video input, such as from a webcam or smartphone camera, to capture and process frames continuously. The YOLOv5 model analyzes each frame to detect and classify hand gestures accurately. When a help gesture is recognized, the system triggers an appropriate response. The Help Gesture Recognition System offers a practical solution to enhance human-computer interaction by detecting and responding to calls for help in real-time. Further optimizations and improvements can be explored to expand its capabilities, making it a valuable tool for personal safety and emergency situations.

Application Development For Industrial Equipment Monitoring

YASH CHAVAN
VEDANGEE DIWATE

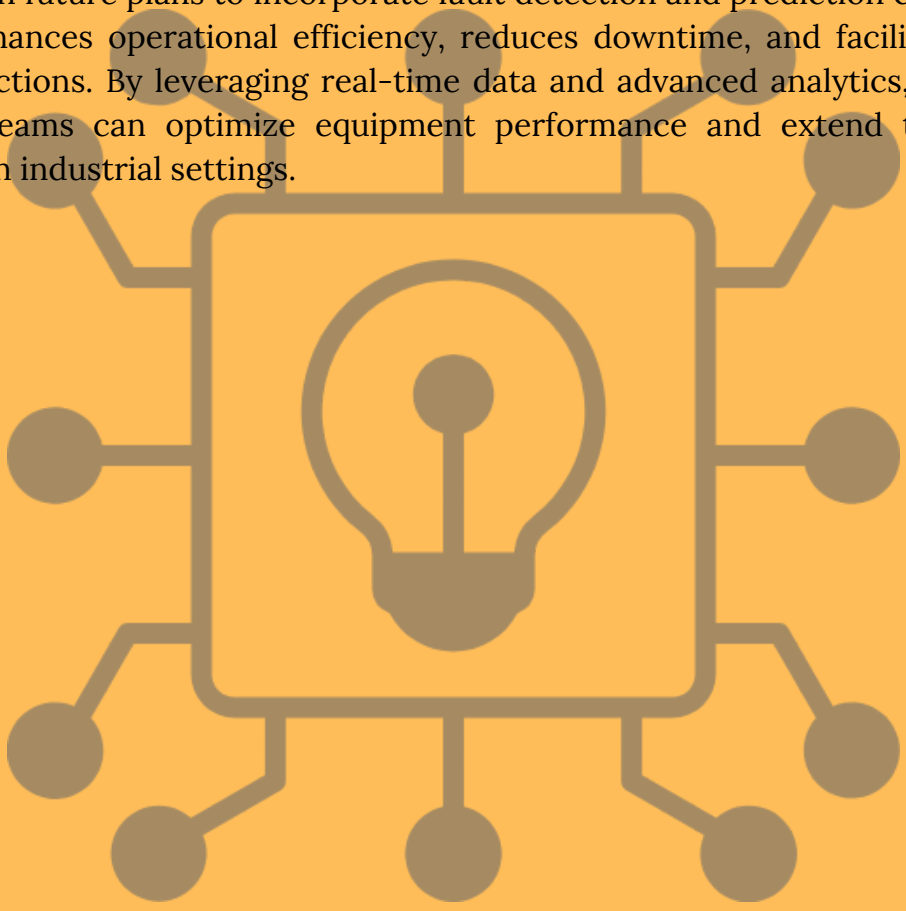
This project focuses on developing an application for real-time monitoring of industrial equipment, aiming to integrate fault detection and prediction capabilities in the future. The application provides operators and maintenance teams with a user-friendly interface to monitor the health and performance of industrial equipment, enabling timely decision-making and proactive maintenance actions.The developed application utilizes modern technologies to collect real-time data from sensors installed on the industrial equipment. The collected data includes various parameters such as temperature, pressure, vibration, and other relevant variables. The application processes and analyzes this data in real-time, providing live updates and visualizations of the equipment's operating conditions.

The application's current features include a comprehensive dashboard that displays real-time sensor data, enabling operators to monitor key performance indicators and track the equipment's behavior. The dashboard offers customizable views and visualizations to suit the specific needs of operators and maintenance teams. The next phase of the project involves the implementation of fault detection and prediction capabilities within the application. This future enhancement will utilize advanced algorithms and machine learning techniques to analyze the historical data collected by the application, enabling the system to detect anomalies, identify patterns of equipment failure, and predict potential faults. The application will leverage this predictive capability to provide early warnings and recommendations

for maintenance activities, thereby minimizing equipment downtime and reducing maintenance costs. The fault detection and prediction module will be seamlessly integrated into the existing application, leveraging the data processing infrastructure and user interface. It will provide insights into the health and performance of the industrial equipment, empowering operators and maintenance teams to make data-driven decisions for proactive maintenance and optimization of equipment performance.

The project prioritizes scalability, reliability, and security throughout the development process. The application architecture ensures seamless integration with various industrial equipment types and the ability to handle large volumes of real-time data. Robust security measures are implemented to safeguard sensitive data and ensure the integrity of the system.

Overall, this project aims to develop an application for real-time monitoring of industrial equipment, with future plans to incorporate fault detection and prediction capabilities. The application enhances operational efficiency, reduces downtime, and facilitates proactive maintenance actions. By leveraging real-time data and advanced analytics, operators and maintenance teams can optimize equipment performance and extend the lifespan of critical assets in industrial settings.



Energy Monitoring System

SADANAND JORI
SAKSHI KSHIRSAGAR
SAMIKSHA SARNAIK

In India, since the late 1900s, electric energy has played a vital role in our lives and is widely used for domestic as well as industrial purposes. But electricity is majorly produced from non-renewable resources thus using it efficiently is a major concern. One of the best to optimize energy consumption is by understanding the energy consumption patterns, this can be understood by monitoring energy. Electronic metering systems are advancing rapidly, thus there is a need for efficient and reliable Automate Energy metering systems. Traditional electromechanical gauges, still in widespread use today, tend to drift over temperature and time due to the mechanical properties of the components within the gauge. The problem is exacerbated when collecting meter readings and creating invoices. Here, we are proposing a system using which we can monitor the energy consumption of a user remotely. Wireless communication models will be used in this system to get the data remotely. The proposed system can replace the traditional meter reading method i.e. energy consumption can be monitored without a person visiting each house. Energy monitoring systems will also help user to understand energy consumption patterns and they can be notified of the different ways to maximize power saving.

Pedestrian and Road Obstruct Detection Using Machine Learning

DARSHAN A. PATIL
SHRUTI S. DAREKAR
VAISHNAVI M. TAWDE

Detecting and classifying road obstacles is one of the key tasks in self-driving car perception systems. Vehicle tracking involves vehicle position and the association between frames, thus requiring vehicle detection and classification. A view-based approach is popular for this task due to the cost-effectiveness and usefulness of appearance information associated with view data.

We present a new obstacle and pedestrian detection method with low computational complexity and high detection performance on small targets. Infrared (IR) imaging area named YOLOv5 for low detection rate and high false alarm rate caused by long range, weak energy, and low resolution to solve object detection problems in infrared imagery such as a free object detector.

ADAS (Advanced Driver Assistance Systems) has become a hot research topic over the last decade and is gaining more and more attention. Such systems are designed to reduce the frequency of traffic accidents by providing drivers with important in formation. one of the most complex ADAS is Pedestrian Detection, which plays an important role in protecting people. Compared to the commonly used laser infrared cameras, the visible camera has the unique advantage of hardware cost. This project focuses on the aspects: the detection performance against small human targets of Pedestrian detection under real road conditions.

Impact of LULC on LST Over Pune District

CEANA SAJI
SHRUTIKA KURUNKAR
SURYA PRAKASH DAS

Land use and land cover change (LULC) have a significant impact on land surface temperature (LST) and play a crucial role in shaping urban and regional climates. The Pune Municipal Corporation (PMC) and Pimpri-Chinchwad Municipal Corporation (PCMC) areas have experienced rapid LULC changes due to urbanization, population growth, economic development, agriculture expansion, deforestation, and natural dis asters. These changes have resulted in notable variations in LST, especially in urban areas.This study focuses on analyzing LULC changes and their influence on LST in PMC and PCMC using Landsat satellite images from 2000 to 2020. Remote sensing techniques and ArcGIS software are utilized to process the satellite images and generate LULC maps and LST maps. The land cover is classified into four categories: water bodies, vegetation, barren land, and built-up areas. LST maps are derived by analyzing the thermal band data from the Landsat images. The overlay and analysis of these maps provide insights into the impact of LULC changes on LST.

The results indicate a significant increase in built-up areas, expanding from 3% in 2000 to 18.63% in 2020. This rapid urbanization has led to temperature increases of up to 5.5°C in certain areas. Barren land has decreased from 58% in 2000 to 36.03% in 2020, while vegetation initially increased to 44% in 2010 but subsequently declined to 41.95% in 2020.The study also examines LST variations across different seasons. In summer, built-up areas show increasing LST trends, while barren land registers the highest LST values. Water bodies and vegetation exhibit lower LST values due to their cooling effects. In winter, built-up areas demonstrate lower LST values, while barren land records the highest LST values.

Bizz 3 Solutions

AAYUSH JOSHI
ADITI NAIK
ALAN ROY

From the beginning of mankind, humans have been a part of barter systems with interactions between buyers and sellers. These business transactions have evolved to become the mass market of today. The execution of these transactions becomes intricate and complex inside the larger commerce ecosystem, across categories and territory, with the fragmented and decentralized market.

Since the advent of the internet, the marketplaces have expanded digitally, enabling suppliers and customers to transact online. Digitization has significantly changed how goods and services are distributed globally and has revolutionized market interactions, fundamentally changing conventional wisdom in a number of industries, including retail, mobility, travel, and hospitality. COVID-19 has boosted the number of businesses going on the online platform. Digital e-commerce has contributed majorly in globalization. Trade centers have witnessed a boom in transactions between businesses to consumers and business to business.

Such e-commerce requires efficient communication between vendors and customers to enable fluent transactions. So here, we create a Business Aggregator Platform for the small scale and large scale business entities. Availability of multiple platforms makes it tedious for users to buy products and for vendors to list their products. We are making an umbrella approach to include the entire network of businesses under one. This business aggregator platform is to enable integration of multiple businesses to provide the best solutions to customers.

This system will provide interaction between: customer and supplier; business to business; manufacturer to supplier. There will also be a scope for handling accounts and billing based on the needs of the respective customer and supplier, along with handling logistics.

Online Fake Review Detection Using SVM

Avantika Tellawar
Samiksha Wattamwar

Online fake review detection is a crucial area of research in the field of natural language processing and machine learning. With the rise of e-commerce, social media, and online platforms, fake reviews have become a major concern for businesses and consumers. In this project, we propose a novel approach to detect fake reviews using machine learning techniques.

The proposed methodology involves preprocessing the reviews, extracting features from them, and then training a classification model using various machine learning algorithms. We conducted a comprehensive literature survey to understand the existing methods and techniques used for fake review detection. Based on our findings, we designed and implemented a system that can accurately identify fake reviews with high precision and recall.

The project implementation chapter discusses the various steps involved in the development of the system, including data collection, preprocessing, feature extraction, model selection, and evaluation. We used publicly available datasets and conducted experiments on various machine learning algorithms such as Support Vector Machines, and Naive Bayes. We evaluated the performance of our system using accuracy.
In the results and discussion chapter, we present the results of our experiments and compare our system's performance with existing methods. Our system achieved an accuracy of 80% We also analyzed the features that contribute most to the classification of fake and genuine reviews and discussed the limitations and challenges faced during the development of the system.

In conclusion, our proposed methodology for online fake review detection shows promising results and can be used by businesses and consumers to identify fake reviews. Our system's high accuracy, precision, and recall indicate its effectiveness in detecting fake reviews. In the future, we plan to explore more advanced machine learning algorithms and feature engineering techniques to improve the system's performance. We also plan to develop a web-based application to make our system accessible to a wider audience.

BHAI (Bharat Highway Assistance & Integrator)

ABHISHEK KULKARNI
MUGDHA DESHMUKH
HARSH MEWADA

Highways play a vital role in facilitating transportation and economic development in India. With the expansion and improvement of highway infrastructure across the country, there is a growing need for efficient services to enhance the travel experience for highway users. One significant challenge faced by travelers is the lack of reliable roadside assistance in case of emergencies or breakdowns. To address this issue and provide a comprehensive solution, the Bharat Highway Assistance and Integra tor (BHAI) application was developed. BHAI is a multi-service application designed to offer a range of services to highway travelers. It includes features such as roadside assistance, pre-booking food systems, location services for medical facilities and pharmacies, and information about washroom facilities along highways. The objective of BHAI is to provide a seamless and convenient experience for users, ensuring their safety and comfort while traveling. By integrating these essential services into a single plat form, BHAI aims to streamline the travel experience and overcome the challenges faced by highway users. It offers quick and reliable assistance in case of vehicle breakdowns, allows users to plan their meals in advance, helps locate nearby medical facilities and pharmacies, and provides information about accessible washrooms along the highways.

Suitability Analysis and Estimation of Power for Setting Solar Power Plants in Pune

AKASH SOLUNKE
DARSHAN S. PATIL
VARAD KULKARNI

The transition towards renewable energy sources, driven by concerns over climate change and dwindling fossil fuel reserves, has propelled the adoption of solar power as a sustainable solution. Setting up solar plants requires a thorough understanding of site suitability and accurate estimation of power generation potential. This study delves into the methodologies and techniques used in suitability analysis and power estimation for solar plant installations.

The objective of this research is to investigate the factors influencing site selection for solar plants, including solar irradiation levels, topography, shading, land availability, and environmental considerations. It explores the tools and models employed for suitability analysis, such as GIS-based tools and solar energy modeling software. The research also examines methods for estimating the power generation potential of solar plants, considering panel efficiency, orientation, tilt angle, and meteorological data.
The study reviews existing literature, case studies, and practical applications to provide a comprehensive understanding of suitability analysis and power estimation. It offers insights into best practices and lessons learned from successful solar plant installations. The findings aim to inform stakeholders, including solar energy developers, policymakers, and decision-makers, enabling them to make informed choices and optimize resource allocation.

The scope of this study encompasses the evaluation of solar irradiation levels, topography analysis, shading analysis, land availability, and environmental considerations. It also covers panel efficiency analysis, optimization of orientation and tilt angle, and the analysis of meteorological data. However, the design and engineering aspects of solar plants and economic analysis are beyond the scope of this research.

Urban Sprawl Assessment of Pune District

ALANKRIT SINHA
ARCHIT VERMA
VINAYAK PARASHAR

The physical growth of urban areas is known as Urbanization. It refers to physical growth leading to population growth, an increase in the built-up area, and a high density population. Rapid urbanization gives rise to problems such as obstruction of forest and river areas and uncertified urban sprawl whose lookout is of utmost importance while implementing government and non-government policies to optimize the use of natural resources and diminish the effect on the environment. Land Use/Land Cover plays an important role in planning and monitoring the use of natural resources based on the progressive increase of human demand in modern ecosystems. This research mainly focuses on the use of Geographic Information System(GIS). Rapid urbanization is causing many problems, including encroachment on forests and river basins, loss of agricultural land, unlicensed urban sprawl, and the value of highlands. Non- governmental organizations implement policies to optimize the use of natural resources while developing to minimize environmental impact. The Project is mainly focused on carrying out Land use/Land Cover of the Pune District for the years 2000,2010 and 2022. The LULC is carried out by the use of ARCGIS Software with the use of 3 classification method, namely Random Forest, Maximum Likelihood and Support Vector Machines. Parameters taken in order to carry out LULC are Built-up area, Water bodies, vegetation and Barren land. The LULC maps of three different years from these classifier methods are obtained after which the changing trends over the various years are studied, The percentage increase in built-up area, decrease in vegetation, increase/decrease in barren land and etc. After this the prediction of Pune district for the year 2030 is carried out by the use of the Markov Chain model which uses a transition matrix. Accuracy Evaluation of the result obtained is also carried out by comparing the obtained data against expert data/observed data or through validation methods.

Rover for Small Scale Farmers

KUNAL NIMBONE
PRANAV KULKARNI
PRANAV GAIKWAD
SOURABH KADAM

Agriculture plays a critical role in the Indian economy, with a large portion of the population dependent on it for their livelihood. Unmanned Ground Vehicles (UGVs) have become increasingly popular in the agricultural industry, particularly for spraying fertilizers and pesticides. However, there is currently no platform available that can provide rover chemical spraying in high-risk areas at a low cost for extended periods of time.

The primary goal of this project is to design and develop an unmanned chemical spraying rover that can overcome any obstacle on agricultural fields. It will also feature a simple and indigenous low-cost mechanism for precise spraying of agricultural enhancers such as fertilizers, pesticides, and insecticides. This platform must cost less than similar alternatives available in the market.

Users will be able to achieve controllable motion and variable flow of the enhancer using a suitable tethered, ground-based remote control interface. Additionally, the project aims to create a multi-purpose rover machine that can be used in tortuous terrain, crops, and plantations of divergent heights.

The rover will be maneuvered using four geared motors, each attached to one wheel, and its movement will be controlled using Bluetooth remote control. The transmitter will be a smartphone, providing a simple and user-friendly interface for farmers.
Overall, this project has the potential to provide a low-cost and efficient solution to the challenges faced by small scale farmers in India. By developing an unmanned chemical spraying rover, farmers can increase their productivity while reducing labor costs, ultimately helping to improve their livelihoods.

Inventory Management System for SME Sectors

Kalyani Kathane
Kavita Gaikwad
Kumar Shivam Singh

The Small and Medium-sized Enterprises sector in India contributes to about 40% of India's market share in exports around the world and plays a pivotal role in India's GDP. The S.M.E. sector as a whole has been disorganized in nature through its lineage, and a lot of applications and products have tried to modernize S.M.E. but have failed tremendously. With the new age of online payment and transaction, which has been adopted by various S.M.E. sectors, there has been a new ray of light where we can see a way to modernize various aspects and have a more organize approach towards various aspects, which can help to boost their sales and figures. The idea to provide an analysis on various aspects such as cost, trends, and inventory management has been adopted by various big conglomerates, which has helped them to create various advances in their field. Analysis and planning have been crucial aspects that have often been overlooked in various SME sectors. This lack of focus on forecasting performance based on industry trends has hindered their ability to effectively manage inventory systems and develop consistent plans. By adopting a predictive model, SMEs would be able to anticipate their performance, make informed decisions, and create more efficient and effective plans for their businesses. The proposed system establishes or provides a groundwork analysis on the preexisting data, which can be consumed in an easy format such as a dashboard in their regional language and a basic data layout on their finances and inventory. Inventory space and management play a pivotal role in knowing what can be included in the inventory space and what has been the trend with respect to the space and commodities available. The preliminary requirement that would be given by the user would be with respect to their pre-existing data in a digital format, thus making sure that we have basic data to work with. The primary data would be with respect to an image of the inventory space and a category-wise detailed description of the commodity being used. The data would then be pushed to a preprocessing method where an anomaly would be detected, thus making the system faster and more reliable. The idea is to have the data ready for the Machine Learning module, which would be responsible for finding out the inventory space available.

After having a concentrated set of data, the next step would be to push the data to a visualization software, which would highlight various trends with respect to the various commodities available. Creating a platform with respect to these aspects can help streamline any plans or guide the vendor to understand or make any recommended changes to his or her business model.

Comparison of Soil Cultivation Farming and Deep Water Culture Hydroponics Using IoT

Ashwini Chaudhari
Payal Jadhav
Madhusudan Kumbhar

In a developing country like India, where agriculture is the backbone of the country, agriculture is plagued by several problems like small and fragmented land holdings, manures, pesticides, chemicals used for agriculture etc. consumers also increasingly demand for the healthy diet that is rich in quality and free of agricultural chemicals and pesticides. Our project fills in the above said difficulties and demands using hydroponics we can go organic. Since it is done in the controlled environment, it can be done anywhere like room terrace, balcony etc. also large amount of plants can be planted in a less place. This type of agriculture could be high yielding if monitored and controlled efficiently. We propose a project that controls the necessary conditions required for the plant to grow hydroponically and also cultivators may control the agriculture remotely using IoT.

IoT Based Attendance System Using BLE with Wi-Fi Access Point

Omkar Khadake
Ashish Hande
Kajal Yadav
Ninad Shahgadkar

In lectures, teachers and administrative staff have a difficult time verifying attendance because of the massive amount of student data. Students' attendance can be tracked on campus and in classrooms/laboratories using our suggested solution i.e., IoT-based attendance system using BLE and Wi-Fi access point. Attendance tracking is necessary in academic institutions and it may be used to monitor each personnel's attendance within their individual businesses. Due to the previous suggested technologies (Bar-code, RFID and Bio-metrics) being costly since it requires lot of materials and technology to manufacture, high maintenance, and manual scanning to read the data, it is safe to say that Bar-code and RFID were discarded from our project. In the year 2023 the risk of contamination cannot be overlooked, hence we discarded the idea of fingerprint scanners (a Bio-Metric technology).

Bluetooth-enabled devices can set an enclosed perimeter using received signal strength (RSSI) measurements. ESP32's BLE receiver function can locate BLE-compatible de vices. After successful detection of the desired BLE beacon, the device name/UUID and the respective location where the device was detected is sent to a database using HTTP protocol and further the data is processed based on certain parameters to obtain the attendance data. This significantly streamlines the process of recording attendance and decreases paperwork because the data is digitally stored. The absent students and their respective parents are sent an SMS stating the absentee and location details. BLE beacons (nRF51822), as the name BLE (Bluetooth Low Energy) suggests, requires low energy to work, thus they can run for several months on a single CR2032 3V battery.

Comparing Two Computer Vision Techniques for Fire Detection

Dhruvil Bhavsar
Rushab Bagrecha
Sarvesh Ingale

YOLO has yielded state-of-the-art performance in image classification and other computer vision tasks. Their application in fire detection systems will substantially improve detection accuracy, which will eventually minimize fire disasters and reduce the ecological and social ramifications. However, the major concern with -based fire detection systems is their implementation in real-world surveillance networks, due to their high memory and computational requirements for inference. We propose an original and computationally efficient architecture, inspired by the Squeeze Net architecture for fire detection, localization, and semantic understanding of the scene of the fire. It uses smaller kernels and contains no dense, fully connected layers, which helps keep the computational requirements to a minimum. Despite its low computational needs, the experimental results demonstrate that our proposed solution achieves accuracies that are comparable to other, more complex models, mainly due to its increased depth. Moreover, shows how a tradeoff can be reached between fire detection accuracy and efficiency, by considering the specific characteristics of the problem of interest and the variety of fire data

Smart Vending Machine Using RFID

Priyanka Kolhe
Maithilee Mule
Manisha Sonawane

This project proposes the development of a smart vending machine system utilizing Radio Frequency Identification (RFID) technology. The aim is to enhance the traditional vending machine experience by introducing an efficient, convenient, and secure method for product selection and payment. The system incorporates RFID tags and readers to enable seamless interaction between the vending machine and the users. Each product is equipped with a unique RFID tag, which can be easily detected and identified by the machine's RFID reader. When a user approaches the vending machine, they can simply place their RFID-enabled card or smartphone near the reader to initiate the transaction process. Upon successful authentication, the user is presented with a user-friendly interface on the machine's display, showcasing available products along with relevant information such as pricing, ingredients, and nutritional facts. The user can make their selection by interacting with the touchscreen or physical buttons provided on the machine. Once the user has made their selection, the system automatically deducts the appropriate amount from their RFID-enabled card or smartphone, ensuring a seamless and cashless transaction experience. These elected product is then dispensed by the machine, and the user can collect it. To ensure the security of transactions, the RFID technology employs encryption and authentication protocols, protecting sensitive user information from unauthorized access or tampering. Additionally, the system can be configured to generate transaction logs for monitoring and analysis purposes, enabling vending machine operators to gain valuable insights into customer preferences and stock management. The implementation of this RFID-based smart vending machine system offers numerous benefits, including increased efficiency, reduced transaction time, enhanced user experience, and improved inventory management. It streamlines the purchasing process, eliminates the need for physical currency, and provides valuable data for business optimization. In conclusion, the proposed RFID-based smart vending machine system aims to revolutionize the traditional vending machine industry by leveraging RFID technology for seamless product selection, payment, and enhanced user experience.

LI-ION Cell Sorting Machine

Sidheshwar Raut
Umesh Pawar
Deep Waghmare

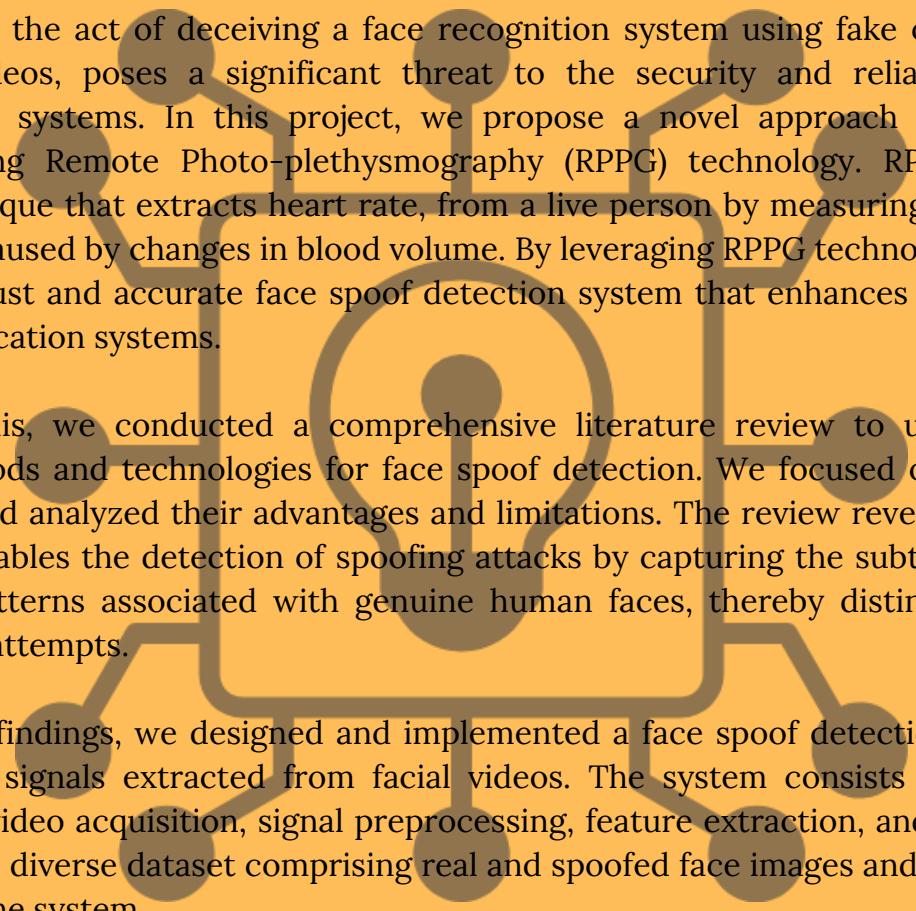
To solve the problems of the decreased reliability and safety of battery pack due to the inconsistency between batteries after single batteries are grouped is of great significance to find an appropriate sorting method of single batteries. This study systematically reviews the available literature on battery sorting applications for battery researchers and users. These methods can be roughly divided into three types: direct measurement, sorting based on the model, and sorting based on the material chemistry of batteries. Among them, direct measurement is about the direct measurement of the state parameters of batteries using some professional instruments or testing tools to sort and group batteries with similar or close parameters. Sorting based on the model classifies batteries into groups by establishing a battery equivalent model and carrying out model identification and parameter estimation with machine learning or artificial intelligence algorithm. Sorting based on the material chemistry of batteries is to explore some characteristics related to the chemical mechanism inside the battery. On the basis of reading extensive literature, the methods for classification of battery are provided with an in-depth explanation, and each corresponding strengths and weak nesses of these methods are analyzed. Finally, the future developments of advanced sorting algorithms and batteries prospect. The sorting machine utilizes computer vision techniques and machine learning algorithms to analyze the physical attributes and characteristics of Li-ion cells. The system employs cameras and sensors to capture images and collect data about the cells, which are then processed in real-time using image processing techniques. The data is fed into a machine learning model that has been trained to recognize and classify different types of Li-ion cells based on specific parameters such as size, shape, voltage, and capacity.

The conveyor belt system plays a crucial role in transporting the Li-ion cells through the sorting process. It ensures a continuous flow of cells and facilitates their movement from one stage to another. The system is equipped with mechanisms to adjust the speed and position of the conveyor belt to optimize the sorting efficiency and accuracy. The project includes the development of a user-friendly interface that allows operators to configure sorting parameters, monitor the sorting process, and manage exceptions or errors. The interface provides real-time feedback on the status of the Li-ion cells being sorted, ensuring smooth operation and easy troubleshooting.

The Li-ion Cell Sorting Machine using Conveyor Belt project offers several advantages over manual sorting methods. It improves sorting accuracy, increases productivity, and reduces labor-intensive tasks. By automating the process, it also minimizes the risk of human error and ensures consistent and reliable results.

Face Spoof Detection Using RPPG Technology

Vikram D. Sawant
Tejal S. Wagh
Ayush Gupta



Face spoofing, the act of deceiving a face recognition system using fake or manipulated images or videos, poses a significant threat to the security and reliability of facial authentication systems. In this project, we propose a novel approach for face spoof detection using Remote Photo-plethysmography (RPPG) technology. RPPG is a non-contact technique that extracts heart rate, from a live person by measuring the variations in skin color caused by changes in blood volume. By leveraging RPPG technology, we aim to develop a robust and accurate face spoof detection system that enhances the security of facial authentication systems.

To achieve this, we conducted a comprehensive literature review to understand the existing methods and technologies for face spoof detection. We focused on RPPG based approaches and analyzed their advantages and limitations. The review revealed that RPPG technology enables the detection of spoofing attacks by capturing the subtle variations in blood flow patterns associated with genuine human faces, thereby distinguishing them from spoofed attempts.

Based on our findings, we designed and implemented a face spoof detection system that utilizes RPPG signals extracted from facial videos. The system consists of several key components: video acquisition, signal preprocessing, feature extraction, and classification. We collected a diverse dataset comprising real and spoofed face images and videos to train and evaluate the system.

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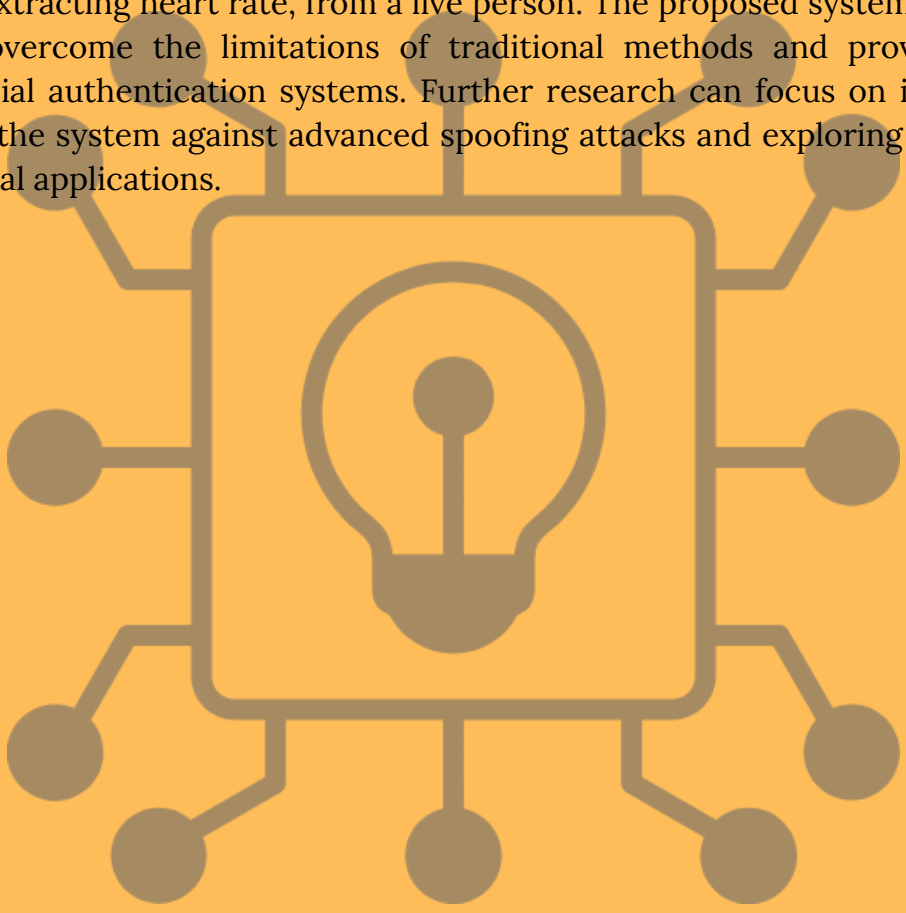
The methodology involved collecting a dataset consisting of various spoofing attack scenarios, including printed photos and 3D masks. We preprocessed the dataset to remove noise and artifacts, and then extracted RPPG signals using state-of-the-art algorithms. The RPPG signals were obtained by analyzing the variations in color in formation in specific regions of interest on the face.

We utilized machine learning techniques to train a classifier on the extracted RPPG features. The classifier was trained to distinguish between genuine and spoofed faces. Several classification algorithms were evaluated, including Support Vector Machines (SVM), Random Forests, and Convolutional Neural Networks (CNN), to identify the most effective approach for face spoof detection using RPPG technology.

In conclusion, this project highlights the effectiveness of RPPG technology in face spoof detection by extracting heart rate, from a live person. The proposed system showcases its potential to overcome the limitations of traditional methods and provide enhanced security in facial authentication systems. Further research can focus on im proving the robustness of the system against advanced spoofing attacks and exploring its integration into commercial applications.



Skin Burn Detection Using Image Processing

Pratik D. Paymode
Prathmesh S. Lande
Sachin K. Patil

Skin cancer at its early stages can be cured. It is a deadly form of burning. Skin burn may appear as malignant or benign form. Skin cancer at its early stages can be cured. But when it is not recognized at its early stages, it begins to spread to other parts of the body and can be deadly. Benign Melanoma is simply appearance of moles on skin. A normal mole is usually an evenly colored brown, tan, or black spot on the skin. It can be either flat or raised. Skin burns are the deadly form of cancers in humans. If skin burns is detected at early stages, it can be cured completely. So an early detection of skin cancer can save the patients. Skin burns are of two types Benign and Malignant Melanoma. Benign melanoma is not a deadly condition, but malignant melanoma is a deadly form. Both resemble same in appearance at the initial stages. Only an expert dermatologist can classify which one is benign and which one is malignant. The CNN based Classification methodology uses Image processing techniques. Main advantage of this computer based CNN classification is that patient does not need to go to hospitals and undergo various painful diagnosing techniques like Biopsy.

Integrated Indoor Farming

Sharath Chandra Palle
Hrithik Mahato
Himadri Behera

The Indoor farm is a world-changing innovation whose time has come. There are lot of natural disasters through the environment which causes to the plant growth and loss of so much crops. On their lot of crop losses due to cyclone, heavy rains, high temperature sunlight etc. even to get solution on this big scale crops little bit tedious, even very complex and difficult. So, we are trying in to the small limited scale plant to grow through the artificial environment, there is neither natural air nor sun light. We are making a project so that plant can grow precise and faster than natural growth. So that it can give desire output which we are assuming to get. Because of this condition and isolated nature from nature we called it indoor farming and cause of today life is about on one hand we are including automation concept on it so that we can even manage it through anywhere in the world. Even with several limitations, the technology has the potential to produce 10 times more per unit area over traditional agriculture and has scope of integrating in the present and futuristic life-style of food production and consumption [1]. Besides this technology is sustainable with several positives like requirement of reduced land, water, fertilizers, pesticides and other inputs. Integrated Indoor Farming is also possible in lakes, under water/above water, in space even in kitchens (micro greens) and in all the places where humans can live and work.Indoor farming can provide continuous crop production and is much more efficient; one acre of indoor farming can cover the food production of 30 acres of farming on the land [4]. Due to the controlled environmental conditions, there is less chance of diseases and insect's/pest attacks which can eliminate the chance of chemical use during farming practices. Many environmental factors such as hail, flood, drought, etc., that cause crop failure are also eliminated due to controlled environmental conditions.

Vision-Based System for Detection of Petrol Pump and Charging Station

Nikita Lohale
Sampada Waghmare
Sushant Sarode

Transportation has become an important aspect of living. Vehicles have changed the lives of people, by playing a significant role in transportation. People can travel as well as transfer loads easily. Majority of vehicles get stuck in the middle of the road, due to lack of fuel. Delays occur in work and the general public is affected.

Rider's unawareness about the status of fuel creates problems. Fuel stations might get skipped due to the high speed of the vehicle. Fuel station detection systems are useful for driver assistance. Drivers can easily find fuel stations if they receive alert messages while driving.

A new approach for petrol pump or charging station detection and it is helpful for driver assistance systems. The main feature of this system is having the ability to continuously find fuel stations from the surrounding area. Sometimes, people may get stuck in the middle of the road due to a lack of fuel in their automobile. There are many technologies developed for object and building detection. Among these several technologies, computer vision solutions have been implemented. This system gives information to users in the form of audio messages.

Mulyankanam: A System for Evaluation of Yoga Poses

Aditya Avchat
Atharva Nathe
Neha Survase

The aim of this project is to develop a machine learning model that can accurately classify yoga poses and predict their accuracy. The project leverages the Media pipe library for pose estimation and key point extraction, along with logistic regression for accuracy prediction. The methodology involves collecting a dataset of yoga pose key points with labeled annotations, preprocessing the data by resizing and normalizing the live feed, and extracting relevant features from the key points. Machine learning models are then trained on the extracted features for both pose classification and accuracy prediction. The performance of the models is evaluated using standard evaluation metrics. Additionally, real-time feedback mechanisms are integrated to provide users with instant feedback which can help user determine how accurately their yoga posture is. The project aims to enhance the practice of yoga by offering a technology-driven approach for accurate pose classification and personalized accuracy prediction.

3P Linking

Dineshkumar Vhananavar
Varun Singh
Pratik Tiwari

3P Linking makes the process of mass mailing fast and easy. It is important to use best direct email marketing software for managing targeted email marketing campaigns. With direct mail, however, you can be incredibly targeted, especially when you take advantage of today's sophisticated demographic management techniques. These let you customize messages for potential customers. That's the beauty, and efficiency of direct mail. We have used SMTP for sending bulk mail because SMTP is the most suggested way to send email from localhost or online server. The advantages of SMTP are that all we have to do is use our credentials and it will work. In case of failure, the message will include an explanation about why the email failed to be delivered. It is extremely easy to start using mail for your transactional emails. All we have to do is exchange ceremonies and we are set to go. Unlike with API, where coding is required. If we use SMTP to send mail, Java has a nice Java Mail API which allows us to send email via SMTP by providing required credentials. If you have any web hosting email account then your hosting company will provide SMTP credentials like username, password, outgoing and incoming server address and port number. By using this information, you can send email from your script. There are many advantages to using bulk mail. The most important advantage is that bulk mailing prices are significantly lower than single-piece prices. That can save you a lot of money. The proposed system is economically feasible because it will save valuable time, money and it is more stable. Automation leads to cost reduction and beneficial to cost analysis of the system economically.

Acknowledgements

Success is achieved through a blend of perfection, hard work, and unwavering determination. Team Gyanamrit is committed to delivering the finest magazine possible.

With this commitment, we have dedicated ourselves to producing this edition. We extend our heartfelt thanks to President Dr. Aruna Katara and express our deep appreciation to our Principal Dr. Vaishali Patil, for her steadfast support and encouragement. Special recognition goes to our HoD Dr. Risil Chhatrala — without whose guidance Gyanamrit would not be where it is today. We are also grateful to all the students, alumni, teachers, and industry experts for their invaluable contributions through articles and interviews.

Finally, we want to acknowledge all our writers and colleagues for their essential role in making this edition a success.

THANK YOU, READERS.

-The Editorial Team
GYANAMRIT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Our Vision

To be a premier academic institution that fosters diversity, value-added education and research, leading to sustainable innovations and transforming learners into leaders..

Our Mission

1. To strive for academic excellence, knowledge enhancement and critical thinking capabilities by adopting innovative and dynamic teaching learning pedagogies.
2. To enrich and leverage interactions and associations through Industry Academia partnerships
3. To groom students so as to make them lifelong learners by helping them imbibe professional, entrepreneurial and leadership qualities.
4. To embrace an environment that allows all stakeholders to benefit from the technology-enabled processes and systems.